Lean Management in Operations

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Get closer than ever to your customers. So close that you tell them what they need well before they realize it themselves.

Steve Jobs

7.1 Operations Management: Gemba, Gembutsu, and Genchi

Operations management was previously called production management, clearly showing its origins in manufacturing. Operations management is the area of management concerned with designing and controlling the process of production and redesigning business operations in the production of goods or services. Operations management is the transformation of goods and services. It involves the responsibility of ensuring that all company activities and business operations are most efficient in terms of using as few resources as needed and effective in terms of meeting customer requirements (James et al. 1997). It is part of the value chain and in between the supply side (procurement of goods) and the demand side (marketing and sales) as shown in Fig. 7.1. Operations management is primarily concerned with planning, organizing, and supervising in the contexts of production, manufacturing, or the provision of services (Helmold and Terry 2016).

Operations is concerned with managing an entire production system which is the process that converts inputs (in the forms of raw material, labour, energy, and resources) into outputs (in the form of goods and/or services) as an asset or delivers a product or services. Operations produce products, manage quality, and create service. Operations management covers sectors like banking systems, hospitals, companies, working with suppliers, customers, and using technology. Operations are one of the major functions in an organization along with supply chains, marketing, finance, and human resources. The operations function requires management of

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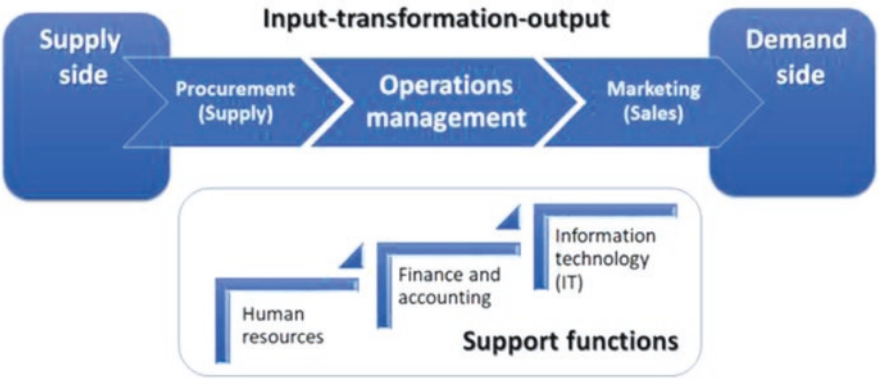

Fig. 7.1 Operations management as part of the value chain. (Source: Marc Helmold)

Fig. 7.2 7R principle in operations management

both the strategic and day-to-day production of goods and services. Operations management involves the production, planning, organizing, and supervising processes of products or services and targets to meet customer demands by delivering the right product or service at the right quality, quantity, time, and place with right people at the right cost. This principle is called the 7R principle and targets the optimal satisfaction of the goal in the operations function. Figure. 7.2 highlights the 7R principle with objectives and criteria behind the objectives (Helmold and Terry 2016).

7.2 Gemba, Gembutsu, and Genchi: Right Place of Happening

Gemba (現場) is also a Japanese term meaning "the real place". Japanese detectives call the crime scene gemba, and Japanese TV reporters may refer to themselves as reporting from gemba. In business, gemba refers to the place where value is created; in manufacturing the gemba is the factory floor. It can be any "site" such as a

construction site, sales floor, or where the service provider interacts directly with the customer. In lean production and supply management, the idea of gemba is that the problems are visible, and the best improvement ideas will come from going to the gemba. The gemba walk, much like management walk around (MWA), is an activity that takes management to the front lines to look for waste and opportunities to practice gemba kaizen, or practical shop floor improvement. In quality management, gemba means the manufacturing floor and the idea is that if a problem occurs, the engineers must go there to understand the full impact of the problem, gathering data from all sources. Unlike focus groups and surveys, gemba visits are not scripted or bound by what one wants to ask. Glenn Mazur introduced this term into quality function and supply management department (QFD, a quality system for new products where manufacturing has not begun) to mean the customer's place of business or lifestyle. The idea is that to be customer-driven, one must go to the customer's gemba to understand his problems and opportunities, using all one's senses to gather and process data.

Gembutsu (現地現物) is a Japanese word meaning "real thing". It is one of the components of the "three reals" meaning go to the real place (gemba) to see the real thing (gembutsu) and collect the real facts (genjitsu). This term simply means that there is no substitute for seeing something with one's own eyes.

Genchi (現地) is the Japanese principle of going to and directly observing a location and its conditions in order to understand and solve any problems faster and more effectively. The phrase literally translated means "go and see for yourself" and is a part of the Toyota Way philosophy (Fig. 7.3).

7.3 Muda, Muri, and Mura

In contrast to the traditional paradigm, the objectives of lean production are based on a reduction of throughput times and the elimination of non-value-adding activities. These activities are waste or so called MUDA (Japanese: 無駄). Both concepts, the traditional and the lean concept, are directed towards customer satisfaction. Nevertheless, the lean concept's foundation is based on the optimal reaction capability and not based on inventories or waste. Inventories increase the cost of capital and have negative impacts on the shareholder value, whereas short cycle times lead to small inventories. Lean manufacturing or lean production, often simply "lean", is a systematic method for the elimination of waste ("muda") within a manufacturing system. Lean also takes into account waste created through overburden ("muri") and waste created through unevenness in workloads ("mura"). Working from the perspective of the client who consumes a product or service, "value" is any action or process that a customer would be willing to pay for. Essentially, lean is centred on making obvious what adds value by reducing everything else. Lean manufacturing is a management philosophy derived mostly from the Toyota Production System (TPS) (hence the term Toyotism is also prevalent) and identified as "lean" only in the 1990s. TPS is renowned for its focus on reduction of the original Toyota seven wastes to improve overall customer value, but there are varying perspectives on how

Fig. 7.3 Bombardier Sifang Transportation: Dr. M. Helmold and B. Lannoye. (Source: Author's source)

this is best achieved. The steady growth of Toyota, from a small company to the world's largest automaker, has focused attention on how it has achieved this success. There are three MUs including MUDA that support the elimination of waste within the philosophy of Toyota. In parallel to MUDA (Japanese: 無駄), there are MURA (Japanese: 無ら) and MURI (Japanese = 無理) which are the ground theory for the TPS. MURA means "in balance", MURI "overutilization". While certain capacities are too scarce (bottleneck), there are other resources significantly below their capacity limits. The main objective of procurement and a strategic supplier management is to apply the JIT principle to the suppliers. Value-adding activities have to be rolled out to all suppliers from raw material to module and keiretsu suppliers. The keiretsu supplier is the closest relationship and connection to a supplier (Japanese: 系列子会社). Keiretsu is an integration of suppliers into the own organization and system; there is in few cases partial ownership involved. There are four pillars for the lean production system. These are the integral parts of a lean production and JIT system. The four pillars consist of the flow, the tact, pull, and zero-defect principle, which have to be introduced simultaneously. In the sense of an optimized supply chain, it is a fundamental activity to implement these four principles towards all areas. Practical examples by Porsche Consulting show that the introduction of the TPS led to radical improvements in terms of errors and defects per car (quality), serial completion time (cost and productivity), and inventory (logistics and delivery). The study reveals that the reduction of defects per car was reduced by 63 percent. The throughput time could be improved by more than 53 percent. This caused a positive situation of inventory by 50 percent. In the JIT approach, it is important that the right part comes in the right quantity in the right quality at the right time to the right place as shown in the 7R principle. This

principle focuses on a zero defect as shown in the next figure. This principle was defined in the previous chapters as part of the objectives. The principles can be regarded as obtaining the right parts at the right quality and at the right time. This has to be in line with the right quantity in the right place by the right people at the right price (Helmold and Terry 2016).

7.4 Heijunka

Heijunka (平準化) is a Japanese word that means "levelling". When implemented correctly, heijunka elegantly – and without haste – helps organizations meet demand while reducing wastes in production and interpersonal processes. The two main objectives are the standardization of operations and the capability of flexible production of alternate derivatives on the same line. Toyota defines heijunka as the overall levelling, in the production schedule, of the volume and variety of items produced in given time periods and adds that it is a prerequisite for just-in-time delivery (Helmold and Samara 2019).

Heijunka allows you to level your production in both volume and product diversity. Lean facilities that have implemented heijunka don't base their production off the actual flow of customer orders. Instead, the company will use the heijunka methodology to calculate the total volume of orders place in a specific time frame and level them out. This allows the facility to produce the same amount and mix each day, without the ebbs and flows of demand cycles (Bertagnolli 2018).

Balancing your workflow has many benefits to your organization. For instance, if you have an above-average week of orders, followed by a below-average week, you end up paying overtime the first week and sending employees home the following. This is waste in the simplest form that could have been avoided with heijunka.

7.5 Poka-Yoke

Poka-yoke (ポカヨケ) is a Japanese term that means "mistake-proofing". A poka-yoke is any mechanism in a lean concept a process that helps an equipment operator avoid (yokeru) mistakes (poka). Its purpose is to eliminate product defects by preventing, correcting, or drawing attention to human or other errors as they occur. The concept was formalized, and the term adopted, by Shigeo Shingo as part of the TPS. It was originally described as baka-yoke, but as this means "fool-proofing" (or "idiot-proofing"), the name was changed to the milder poka-yoke.

7.6 Jidoka

By definition, jidoka (自働化) is a lean method that is widely adopted in manufacturing and product development. Also known as autonomation, it is a simple way of protecting your company from delivering products of low quality or defects to your

customers while trying to keep up your takt time. Jidoka can be defined as automation with human touch.

7.7 Chaku Chaku Line

Chaku Chaku is a way to operate a semiautomated manufacturing line. One or more workers walk around the line, add parts to the processes, and then start the process. While the process works on the part automatically, the worker adds the next part to the next process, and so on. The word "Chaku Chaku" comes from Japanese. It can mean either "Load, Load" (着々), or it can simply be the sound the machine makes while unloading (ちゃくちゃく), similar to "Clack-Clack".

The basic principle of the Chaku Chaku line is very simple. The worker moves around the line from process to process and only loads the parts into the machine. After loading the part, the worker starts the machine and moves to the next process. At the end of the line, the worker starts again from the beginning (Fig. 7.4).

7.8 Case Study: Mazda Lean Operation

Mazda Motor Corporation is based in Hiroshima (Japan) and employees about 50,000 people. Mazda is dedicated to developing vehicles that are distinctive and innovative, using the latest and most advanced technologies to satisfy the diverse needs of customers worldwide. To accomplish this, Mazda created a global R&D network with operations in Japan, the USA, Germany, and China (Wykowski 2019). The corporate vision is: "We love cars and want people to enjoy fulfilling lives

Fig. 7.4 Chaku Chaku line. (Source: Author's source)

through cars. We envision cars existing sustainably with the earth and society, and we will continue to tackle challenges with creative ideas".

1. Brighten people's lives through car ownership.
2. Offer cars that are sustainable with the earth and society to more people.
3. Embrace challenges and seek to master the Doh ("Way" or "Path") of creativity.

Mazda's Brand Essence is "Celebrate Driving". "Celebrate Driving" delivered by Mazda is not just about driving performance. The aim of the branding is: choosing a Mazda shall prize the customer and user with confidence and pride. Additionally, driving a Mazda is also leading up to urge to take on new challenges. Not just our products but every encounter with Mazda evokes the emotion of motion and makes customers' hearts beat with excitement. All of these are contained in our brand essence of "Celebrate Driving". This marketing strategy targets not only existing users but also new customers who are willing to change from existing brands (Mazda 2019). Mazda is a company with the headquarters in Hiroshima (Japan) and uses Toyota methods in operations across the factories and supply chain. Toyota is all about the process about eliminating waste. Mazda is using lean tools like 5S, Kanban cards, Andon, and poka-yoke. All of them are used to improve and optimize the processes through small changes (Kaizen). Mazda is all about making cars. Mazda's lean management starts with the design of each vehicle, in which engineers are brought together with experts from supply chain and manufacturing to make sure that the cars can be produced in the best and most ergonomic way as possible. Mazda states that a car is not simply a bunch of products and metal, but it's a living creature with emotional bound to its driver. That is Mazda's ultimate goal of Kodo, the "Soul of Motion" design.

There are ten plants in Toyota city and just one with two assembly lines in Hiroshima. Toyota has another 2 plants in Japan and 25 over the world. Mazda has one more plant in Japan plus five manufacturing and four assembly plants worldwide. As a result, in 2016 Toyota produced over ten million vehicles, where Mazda assembled over 1.5 million. With Toyota focus on process, there's no surprise their production system is made to be super effective. Cars were moving fast on the assembly line. Workers had precisely defined, simple tasks to perform within short cycle. Toyota's operators spend less than half a minute per station (cycle times). Everything was packed in a small area, so the distances between workstations were minimal.

On the other hand, everything in Mazda was just slower. The cycle times for each operation in Mazda are longer, and workers have more tasks to perform on single units. Mazda is using also lean tools such as Kanban, Andon, and poka-yoke. There is less automation in Mazda. As a result, Mazda assembly line takes significantly more space. In Mazda, it takes 15 hours from stamping to final inspection in Mazda and 17 hours in Toyota's Takaoka Plant (Fig. 7.5).

Fig. 7.5 Mazda headquarters, Hiroshima. (Source: Author's source)

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